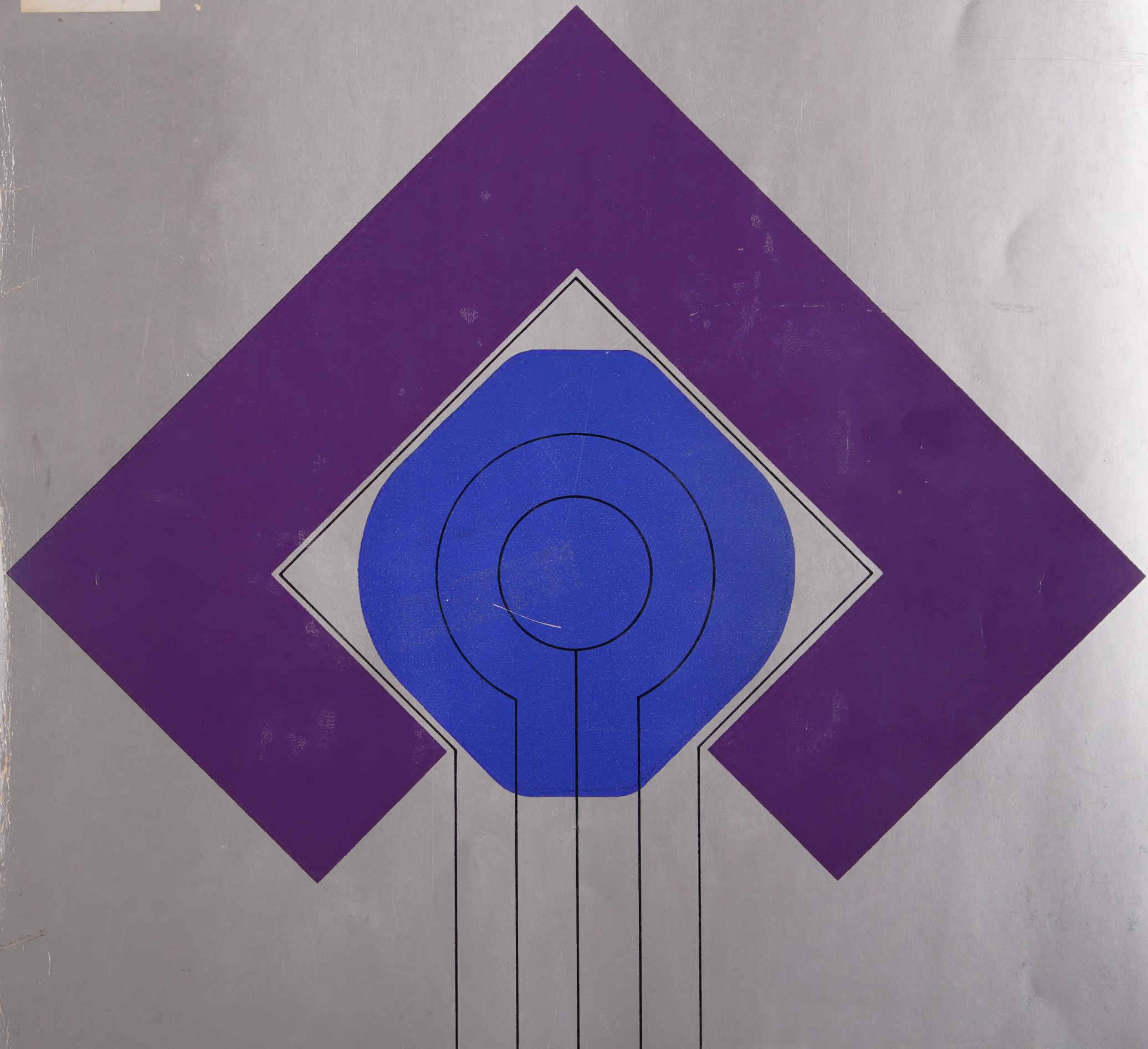


SAN FRANCISCO INTERNATIONAL AIRPORT: DEFINITIVE PLAN

82 01553

TRANSPORTATION



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82 01553
SAN FRANCISCO INTERNATIONAL AIRPORT: DEFINITIVE PLAN

Prepared for the

**PUBLIC UTILITIES COMMISSION
CITY AND COUNTY OF
SAN FRANCISCO**

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**THE SAN FRANCISCO
AIRPORT ARCHITECTS**

John Carl Warnecke and Associates
and Dreyfuss and Blackford,
San Francisco

EXISTING TERMINAL

Board passed by votes Nov. 1967

INTRODUCTION

In September of 1967, the San Francisco Airport Architects, a joint venture firm of John Carl Warnecke and Associates and Dreyfuss and Blackford, were retained by the Public Utilities Commission to prepare a definitive design for the expansion of San Francisco International Airport terminal facilities.

The architects were instructed not only to provide an answer to the looming problems posed by the large passenger volumes of the coming decade but to produce a design that will make San Francisco proud of what it has built, a fitting gateway to a great city.

This design has been developed with the awareness that a major airport is essentially a transfer point between air and surface transportation and to that end must stimulate an even flow of traffic with adequate facilities to cater to the needs of the air traveler.

During the months of this study, the continued help and guidance of the airport management has been of great assistance to this project.

On March 5, 1968 this definitive design for the San Francisco International Airport Terminal was presented to the Public Utilities Commission.

HISTORY

San Francisco International Airport, municipally owned by the City and County of San Francisco, is operated as a department under the jurisdiction of the City's Public Utilities Commission.

Located in San Mateo County, between Bayshore Freeway and San Francisco Bay, it is approximately 14 miles and 20 minutes travel time from downtown San Francisco.

The Airport began operations in mid-1927 on 155 acres of leased pasture lands. Known as Mills Field, it offered a 1,700 foot graded dirt landing strip as a runway, and a frame farmhouse type structure with less than 3,000 square feet of area housed administration and operation offices as well as a weather observation facility.

Today, four decades later, San Francisco International Airport is the fourth busiest in the United States — and ranks fifth in the Free World — in terms of passengers and air cargo volumes. During those 40 years, the City and County of San Francisco, airlines, and other airport tenants have invested approximately \$220 million to meet the ever-changing requirements of the commercial aviation industry. As a major generator of employment and as a catalyst for regional business investment and recreational expenditure, a growing airport is vital to the growing economy of San Francisco and the area it serves.



RESEARCH PHASE

At the beginning of this study a review was made of the 1966 master plan for San Francisco International Airport. This plan provided for a design to accommodate 16 to 18 million passengers annually with a total of 81 aircraft loading positions. Since the completion of this report, dramatic new forecasts of the increased rate of growth of air travel and the impact of the very large passenger aircraft now being constructed have changed the predictions for San Francisco's annual passenger volume from the original figure to an estimated 23 to 25 million passengers by the mid-1970's. The feasibility of relocating the terminal itself to a new location was considered, but limitations in land and the large existing investment in airport facilities make this proposal unfeasible. Instead it was determined to plan in this definitive study the maximum development of the terminal facilities with the maximum number of aircraft loading positions that can be accommodated in this location.

Air traffic studies indicate that the present runway system can accommodate aircraft arrival and departure operations sufficient to utilize a total of 90 aircraft loading positions at the terminal. Therefore, 90 positions became a design objective. To determine optimum field arrangements of aircraft parking positions, the airport retained the firm of Quinton Engineers, Limited, who have submitted a separate study containing their recommendations. The architects for the terminal facilities have worked closely with Quinton Engineers during the course of their work to coordinate the terminal structures to these optimum patterns.

Research was made into the latest technological and operational

developments now employed and being considered by the airline industry. Major airports in this country were visited and conferences were held with airport management to assess their present operating methods and plans for future developments. All firms known to be conducting development programs in passenger moving and baggage handling devices were contacted and information obtained on the present state of the art in these fields and possible future costs.

A series of meetings was held with the Airlines Technical Committee, a group composed of representatives from each of the airlines utilizing facilities at San Francisco International Airport. All using airlines were requested to supply data on their space requirements and aircraft loading positions needed for the design period of this study. As the study progressed, a series of review meetings was held with the Airline Technical Committee for their comments and suggestions. This committee, by official action, gave general endorsement to this definitive plan on February 21, 1968.

A survey was made of the existing airport terminal facilities to determine adequacy of existing structures and to chart present space utilization by type throughout the complex.

To obtain firsthand knowledge of the problems and possibilities in handling the new high capacity passenger aircraft, a trip was made to the Boeing Company in Seattle, Washington to review mock-ups of the 747 and SST aircraft. In addition to these aircraft, data was obtained on all present and contemplated commercial passenger aircraft from manufacturers known to be working in this field.

ALTERNATE PLAN STUDIES

Many different ways of relating aircraft to terminal facilities were studied in arriving at a final solution for San Francisco International Airport. Schemes pursued in detail were (1) remodeling and adding onto the existing pier structures, (2) a satellite system with underground connectors to the terminal, (3) a vehicle loading scheme where passengers are bussed to the aircraft, and (4) the design presented in this report. The advantages and disadvantages of each scheme were studied and comparative costs analyzed.

In considering the remodeling of existing piers to meet the new requirements, a detailed analysis was made of each existing pier, comparing remodeling costs with the cost of new construction which would replace it. Because of the greatly increased space required for the new series of aircraft and the complicated structural problems in adding on to existing construction both horizontally and vertically, the cost of replacing these existing facilities with new optimum construction was not significantly higher than the remodeling costs. In addition, having all new structures of similar type would permit much easier future adaptation to automated systems. New field structures further permitted a substantial increase in the ramp space between structures, thereby providing more maneuvering room for the larger aircraft of the 1970's and beyond.

The selected scheme was chosen as providing the greatest number of aircraft loading positions within the existing space limitations of the ramp area. It provides a high degree of flexibility of aircraft positions and is realizable within the necessary cost limits.

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DESIGN CRITERIA		PRESENT	DESIGN LEVEL
Annual Passengers		12.5 Million	23-25 Million
Peak Hour Passengers		5,300	10,800
Plane Positions		54	88-94
Public Parking Spaces	Garaged	2,700	7,400*
	Surface Lots	2,400	1,600
Ticket Counter and Check-In		722 LF	1,772 LF
Garage Baggage Check Car Positions		0	50-200
Terminal Baggage Claim Frontage: Conventional		1080 LF	2480 LF
Passenger Boarding Lounges		75,000 SF	250,000 SF

*Phases I and II

SELECTED DESIGN

This definitive design is based on a combination of aircraft loading positions directly at the face of the terminal and over-ramp passageways to field buildings called rotundas around which the remaining aircraft will park. The close-in frontal gates at the terminal provide quick access for commuter flights. Long distance flights are located at the field rotundas to utilize the outer ramp space for parking positions. This arrangement can produce a total number of 88 to 94 aircraft loading positions depending on the size of aircraft served.

The terminal is designed to be incremental so that as additional terminal area is needed it can be added around the perimeter roadway in the quantity required. This plan provides for incorporating the existing central and south terminals within a single unified design. The unified concept will not only facilitate interchange of passengers and systems between different parts of the terminal structure, but will present the public with a single, simple terminal identity within which he is required to identify only an airline and a boarding area to reach his destination.

Dr. Robert Horonjeff, in a consultant capacity, developed studies on runway and taxiing configurations, flight frequency limitations and special field requirements to accommodate the larger families of jet aircraft.

Wilbur Smith and Associates, traffic consultants, were retained by the airport to prepare a comprehensive traffic study of the present and projected needs of vehicular movement and parking at the airport. The road patterns and parking facilities shown in this study are based on the recommendations of this report.

TERMINAL AREA PLAN

ACCESS

If the airport is to make its expanded services available to the traveling public, adequate means of access must be provided to its facilities. The basic vehicular access to the terminal will remain the Bayshore Freeway. By 1970 the San Bruno Freeway will connect the new Junipero Serra Freeway with the Bayshore at the northwestern boundary of the airport. Investigations are also taking place to study the feasibility of a secondary parkway connection from the Junipero Serra Freeway directly into the terminal access road.

The present terminal access interchange will have all movements widened from one lane to two lanes. An additional lane will be added to the Bayshore Freeway from the terminal interchange to the San Bruno Freeway interchange making five lanes in each direction on this section.

The widened interchange will feed four lanes of traffic both in and out of the terminal access road.

The congestion caused by the present on-grade crossing of the terminal access road and frontal road system will be eliminated by a grade separation. Detailed engineering studies will be made to compare the cost of the underpass shown to that of an overpass. Carrying the frontage service road beneath the main approach road is strongly recommended to improve the visual approach and avoid the obscuring of signs directing vehicles to the terminal.

The frontal road itself is expanded from the present two lanes to four lanes and connects with new service roads leading to the terminal service facilities. To provide for service traffic from the north ramp area

to the south ramp area, a second underpass beneath the main entrance road system is proposed.

Eventually it may be impossible to carry all passengers to the terminal by highway-operated vehicles. Provisions have been made for the future addition of a public transit loop connecting the terminal to either a local station near the freeway or Southern Pacific Railway lines or a direct system to San Francisco and other Bay Area communities.

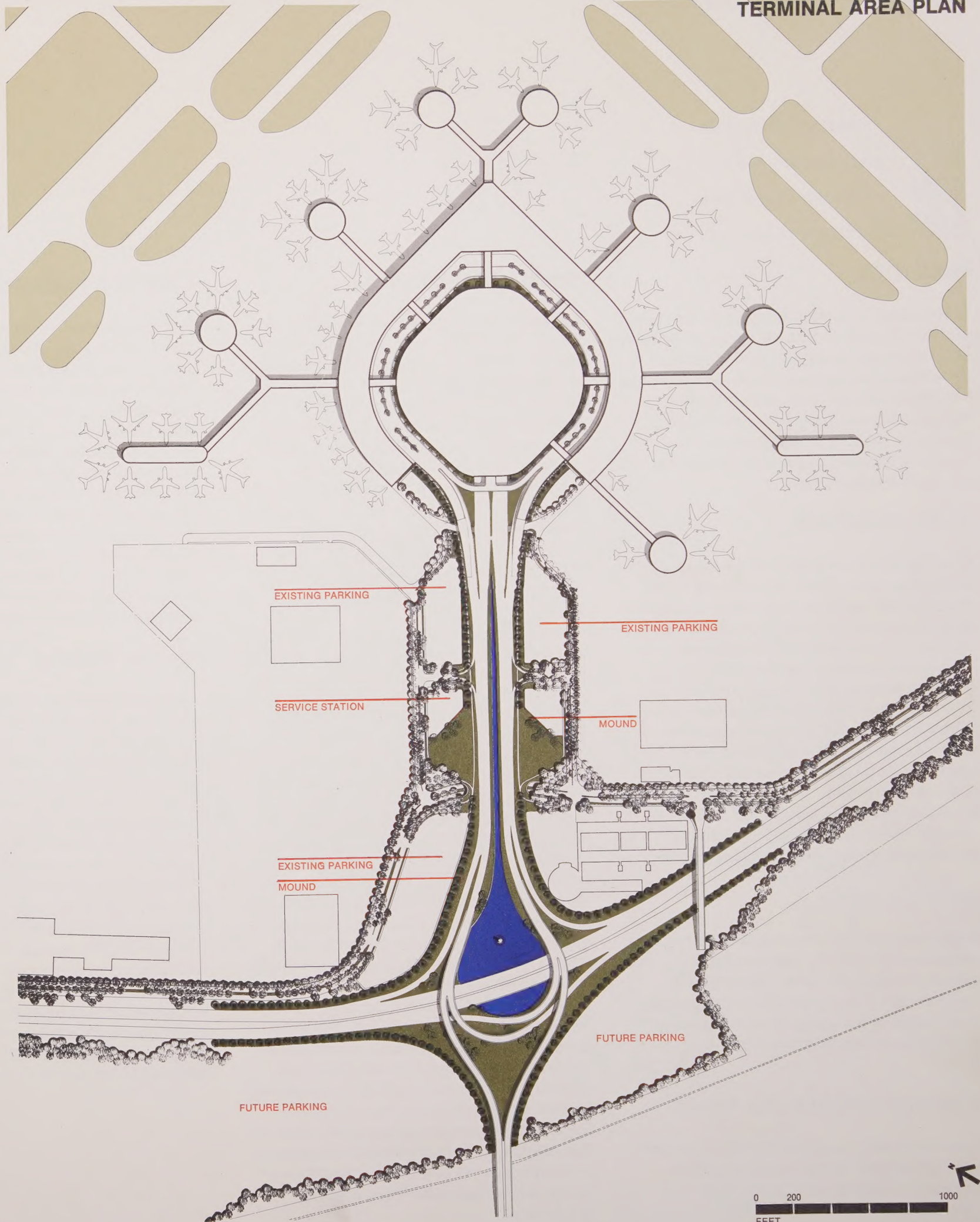
ENTRANCE AND TERMINAL LANDSCAPING

The proposed landscape improvements will replace much of the existing ground cover and shrubbery plantings with neatly maintained lawns and tall evergreen trees. In cooperation with the California State Division of Highways, a proposal to replace the seasonal lagoon at the freeway interchange with a permanent lake will be studied. This lake would be over four hundred feet at its widest point and would extend up as a canal between the divided ten-lane entrance road. A tall jet of water will provide a strong focal point. New walkways will occur in the landscaped parkways on either side of the main drive. These grass areas are gently mounded to an elevation of six feet to obscure the views of employee parking and service areas from the road. The elevated and surface loop drives which provide access to the terminal and the public garage would have tree planting at both the upper and lower levels. New street furniture, special paving, lighting fixtures and carefully selected graphics would be designed to create an attractive pedestrian environment in this busy area.

VEHICLE APPROACH

On approaching the terminal complex the automobile passenger will have three options. He will either enter the parking structure in the center by means of direct ramps from the roadway system or take the upper departures or lower arrivals roadway system around the inside face of the terminal structure. The perimeter terminal roadway ramps will be greatly expanded to a total of five moving lanes plus two unloading lanes providing three times the present curb drop-off space. An elevated connection will also permit cars leaving the northern part of the departures circle to re-enter the southern part or to enter the garage at the fourth level. A similar lower ramp will connect the northern arrivals circle to the southern part and permit entering the garage at the first garage level.

TERMINAL AREA PLAN



GROUND LEVEL PLAN

FACILITIES

The ground level plan is at the apron level and contains all airline baggage processing and passenger baggage claim facilities. It provides lease space for airline operations, kitchen facilities, rental car and other service concessions, and mechanical areas. Immigration, public health, and customs inspection facilities are located in the southwest section.

CURB FRONTAGE

After claiming his bag in the terminal, the passenger may either exit directly from the terminal to the curb frontage for pickup by private car, taxi or limousine, or descend by escalator to one of three tunnels connecting the terminal ring to the garage structure. The perimeter road at the terminal face provides seven lanes between the parking structure and the terminal. Two driving lanes plus two standing lanes are used for curb frontage drop-off and pickup of passengers, and three lanes for through traffic. A total of 4,400 linear feet of curb frontage is provided at the arriving passenger level.

SERVICE ROAD

A two-lane service road circles the terminal complex beneath the new frontal departure lounges at the outer face of the terminal. This road will provide access to all parts of the ramp area and service to ramp level areas in the terminal.

AIRLINES OPERATIONS SPACE

Lease area will be provided for airline field operations both at the terminal and as shown at the ramp level of the field rotundas.

BAGGAGE HANDLING

Baggage will be checked at the present ticket counter location, curbside at the departures level, and at check-in islands within the garage structure. Baggage checked in the garage will descend vertically and cross under the perimeter road system through three tunnels to the north, east, and south sections of the terminal. Initially it is contemplated that the baggage will be carried by conventional conveyor systems, but space will be provided for the installation of the fully automated baggage system now being developed by the airline industry.

From the end of the garage conveyor, baggage will be distributed to make-up areas for the individual airlines along the dotted lines shown. Here the individual airline may option to move its baggage by conveyor to the areas provided at the ramp level under the field rotundas for make-up by flight, or option to make up at the terminal area. When fully automated baggage handling is installed, it is projected that the automated system would carry baggage to make-up areas at the rotunda to minimize the amount of cross apron baggage train traffic otherwise required. Incoming baggage would be conveyed or trailered to the airline handling area for breakdown and distribution to the passenger claim area. Space is provided for 31 baggage carousels for passenger claiming using present techniques. When conversion to automated handling is made, the areas shown for baggage handling and claim will be converted to the automated system. Even with present techniques, it is planned that baggage claim at the check-in islands in the garage will be possible if optioned by the passenger at the time his bag is checked.

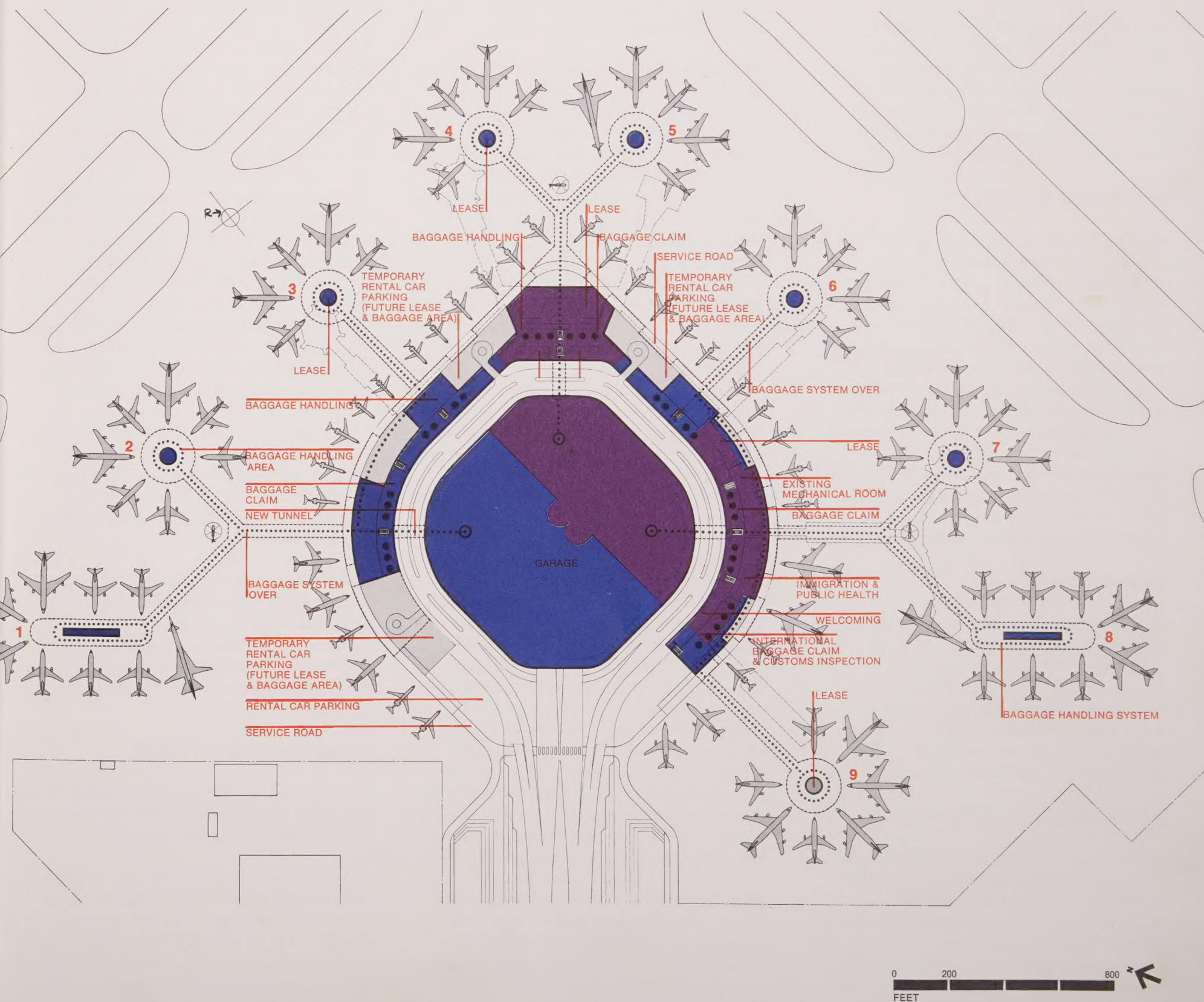
CUSTOMS FACILITIES

The frontal gates shown between rotundas 8 and 9 at the face of the terminal will be used during peak periods for arriving international flights only. This will permit deplaning international passengers to enter directly the U.S. immigration, public health, and customs facilities without requiring isolation corridors from remote field structures. After unloading, aircraft will be moved to maintenance facilities or to assigned gates for reloading outbound flights. The arrangement of baggage claim facilities for international flights will permit use by domestic flights during non-peak international traffic periods.

RENTAL CARS

Two-level rental-ready car storage will be provided in the open court space between the present South Terminal and Central Terminal, between the Central Terminal and the new terminal facilities on the north, and in the area west of the north terminal facilities. The car storage at the baggage claim level will be used for delivery of cars to arriving passengers. The storage at the ticketing level above will be used for the return of cars by departing passengers. Vertical circulation ramps will permit interchange of cars between the two levels, and will provide for future access to the rooftop of the terminal structure for the additional storage of rental cars over all new construction. At the present design level 1,000 rental-ready cars will be provided at the terminal.

BAGGAGE CONVEYOR	
FUTURE DEVELOPMENT	
NEW CONSTRUCTION	
EXISTING CONSTRUCTION	



SECOND LEVEL PLAN

FACILITIES

The second terminal level contains expanded facilities now located at this level. These include baggage check-in, airline ticketing offices, passenger services and concessions, and passenger boarding lounges for frontal and field gates.

BAGGAGE CHECK-IN

The second level is served by an elevated perimeter roadway at the face of the terminal, similar to the baggage level below. Three lanes are provided for through traffic and 4,400 feet of curb frontage are provided for drop-off of passengers. Curbside baggage check-in will be provided at locations spaced around the perimeter. This baggage will descend via conveyors to the make-up areas at the baggage level. Passengers not ticketed will purchase tickets at the counters in the main concourse and check baggage there in the conventional manner.

TICKETING

The ticket counters manned by individual carriers will be provided in the main concourse with supporting office space directly behind. Adjacent to these offices and facing the field will be concession space and services for passenger needs including food service and shops.

FRONTAGE HOLDING AREAS

One-third of all aircraft will park directly at the face of the terminal at holding areas sized to fit the aircraft at each location. These holding areas will be located three feet below the floor level of the existing terminals to be at proper boarding height

for the aircraft. Passengers will descend to the holding lounge level and enter the aircraft through enclosed loading devices.

Spaces shown between the holding rooms are open in the present design phase, but designed to permit incremental expansion of the holding areas as the size of aircraft served increases. It is planned that eventually the entire ring of holding space will be complete with minimum subdivision for maximum flexibility of use.

ARRIVAL AND DEPARTURE ROTUNDAS

Passengers boarding aircraft located at the rotundas will enter wide connecting corridors one level above the ramp space. All aircraft positions have been removed from these connectors to provide point-to-point travel from terminal to rotunda without intermediate destinations or constricting groups of people at holding areas en route. It is proposed to provide moving sidewalks or horizontal passenger moving systems to carry passengers swiftly from the terminal to the rotunda area. All applicable systems will be studied to provide users with the greatest possible convenience within the funding program. The second level location of the connector permits free access for field service vehicles on the ramp space beneath. The connectors will initially carry two-way traffic, but if future traffic requires, a second level can be added as shown on the Mezzanine Plan. Connectors will then provide one-way traffic at each level, departing at the upper level and arriving at the lower level.

The rotunda structures are circular, 200 feet in diameter, and are virtually unobstructed for free passenger movement. They will serve up to seven high capacity aircraft at one time with free exchange of

holding room area between adjacent positions. Initially, when aircraft sizes are smaller, temporary concession islands are located at the holding area level. When space needs require, these concessions will move to the upper or third level of the rotunda to serve the principal concession market, the departing passengers and their friends.

The circular form of the rotunda buildings will permit free location of aircraft around its perimeter according to the size of aircraft to be served. As aircraft sizes change, their parking positions may be relocated around the circle. For this purpose, a design objective will be to create a boarding device also capable of being readily relocated around the perimeter of the structure.

Three helicopter positions are located at the ends of the double rotunda connectors. Additional helicopter positions should be considered at a future elevated platform above the center of the terminal parking structure.

In the present design phase, before the construction of the garage transfer hub system described in the Mezzanine Plan, passengers transferring from one airline to another will be transported by frequent mini-bus service around the perimeter roadway.

CONSTRUCTION PHASE

The rotunda buildings will be constructed first, then temporarily joined to adjacent existing piers for passenger access.

As phasing permits, the rotundas will be joined to the terminal with their permanent connecting corridors and the existing pier structures removed. Rotundas 7, 8 and 9 will continue to use existing structures as connectors for the present design phase.

SECOND LEVEL PLAN

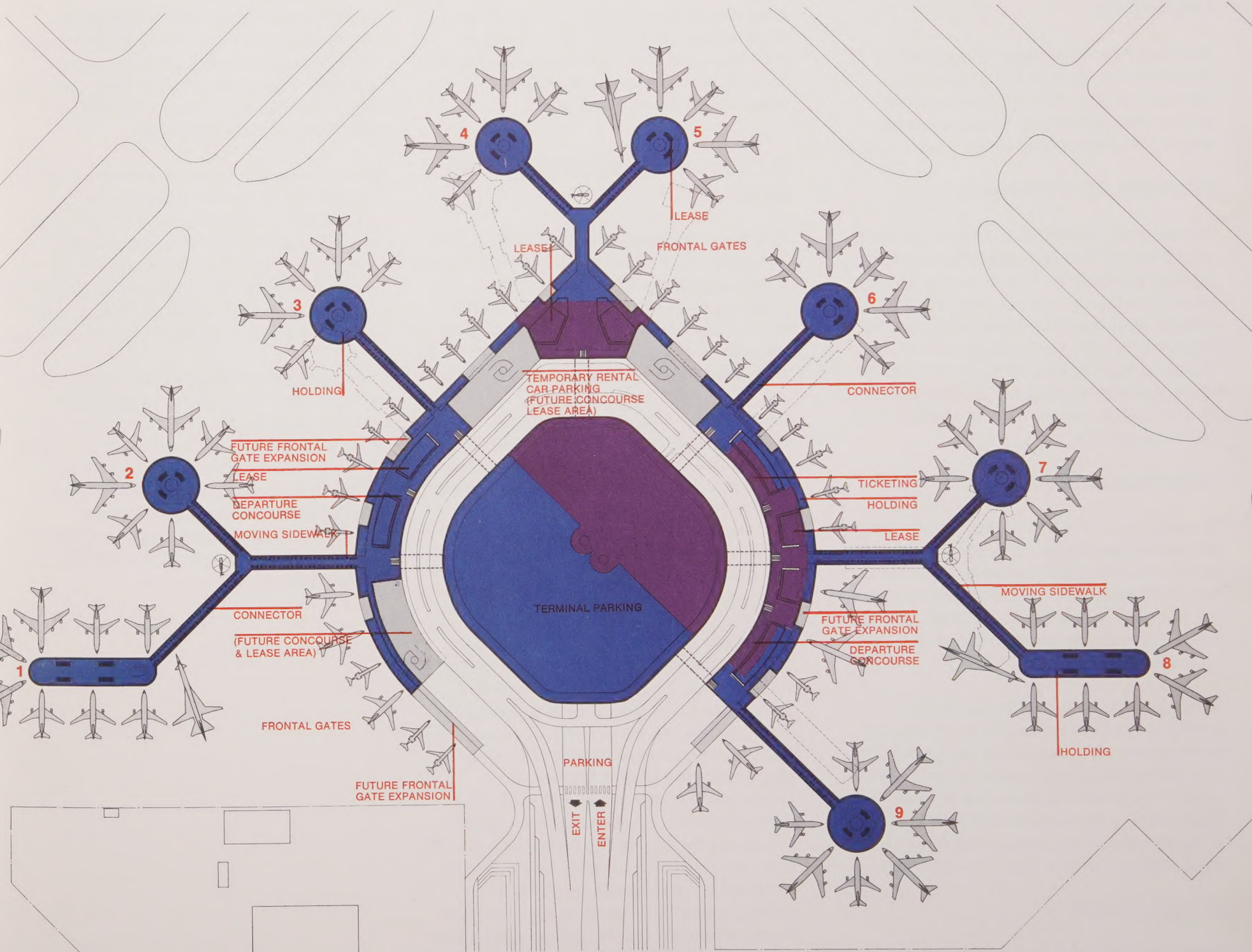
FUTURE DEVELOPMENT



NEW CONSTRUCTION



EXISTING CONSTRUCTION



MEZZANINE LEVEL PLAN

FACILITIES

The mezzanine terminal level contains pedestrian bridges from the parking structure to the terminal, airline lease space, and operations and concession space at the third level of the field rotundas.

BRIDGES TO TERMINAL

Passengers parking in the center parking structure will rise through elevators and moving walks to the fourth level of the garage and walk to the perimeter of the garage structure. Here they will rise one level to one of the six bridges connecting the parking structure with the mezzanine level of the terminal. Each bridge is located directly on an axis with a connecting field rotunda corridor.

TERMINAL AREAS

On entering the terminal during this design phase the passenger will descend from a platform to the ticketing concourse level below. Here he will option to be ticketed at the counters, or enter the frontal holding areas, or proceed through the connectors to the field rotundas.

Provision will be made for the future addition of a mezzanine level above the connecting corridors to the field rotundas, permitting departing passengers to remain at the bridge level and proceed directly to the rotundas and concessions at the upper rotunda level. From here, passengers would descend one level to the holding areas.

LEASE SPACE

Within the terminal the ticketing island structures at the second level will be constructed to permit the completion of an additional occupancy level above them,

providing airline office lease space as required. At the upper level of the field rotundas, space will be provided for airline leasing, concessions, and visitor observation decks as required.

FUTURE PARKING STRUCTURE LEVELS

The parking structure in the center will be designed for a future additional fifth level of parking at the level of the bridges crossing to the terminal. When this fifth level is completed, passengers and greeters will rise by elevators or moving walks to the fifth level and then proceed to the bridges.

In addition to the provisions for passenger movement provided in the present design phase, a rapid system for carrying people from cars to planes is a desirable objective for future development.

Structural provisions will be made for an additional future sixth level which would become the nucleus for a complete radiating people-moving system following the dotted lines shown. When this sixth level is constructed, the extended bridge surfaces will rise above the fifth level parking to reach the circular passenger interchange hub shown. When appropriate passenger-moving systems have been developed and can be financed, passengers and greeters will be able to board a conveying device at the central hub and ride across the bridges to the first stop, the terminal platform. As an option to constructing the additional third level corridor circulation at the corridors to the rotundas, the passenger-conveying system would be constructed on the roof of the second level corridor and would transport people from the terminal stop directly to the third level of the rotunda

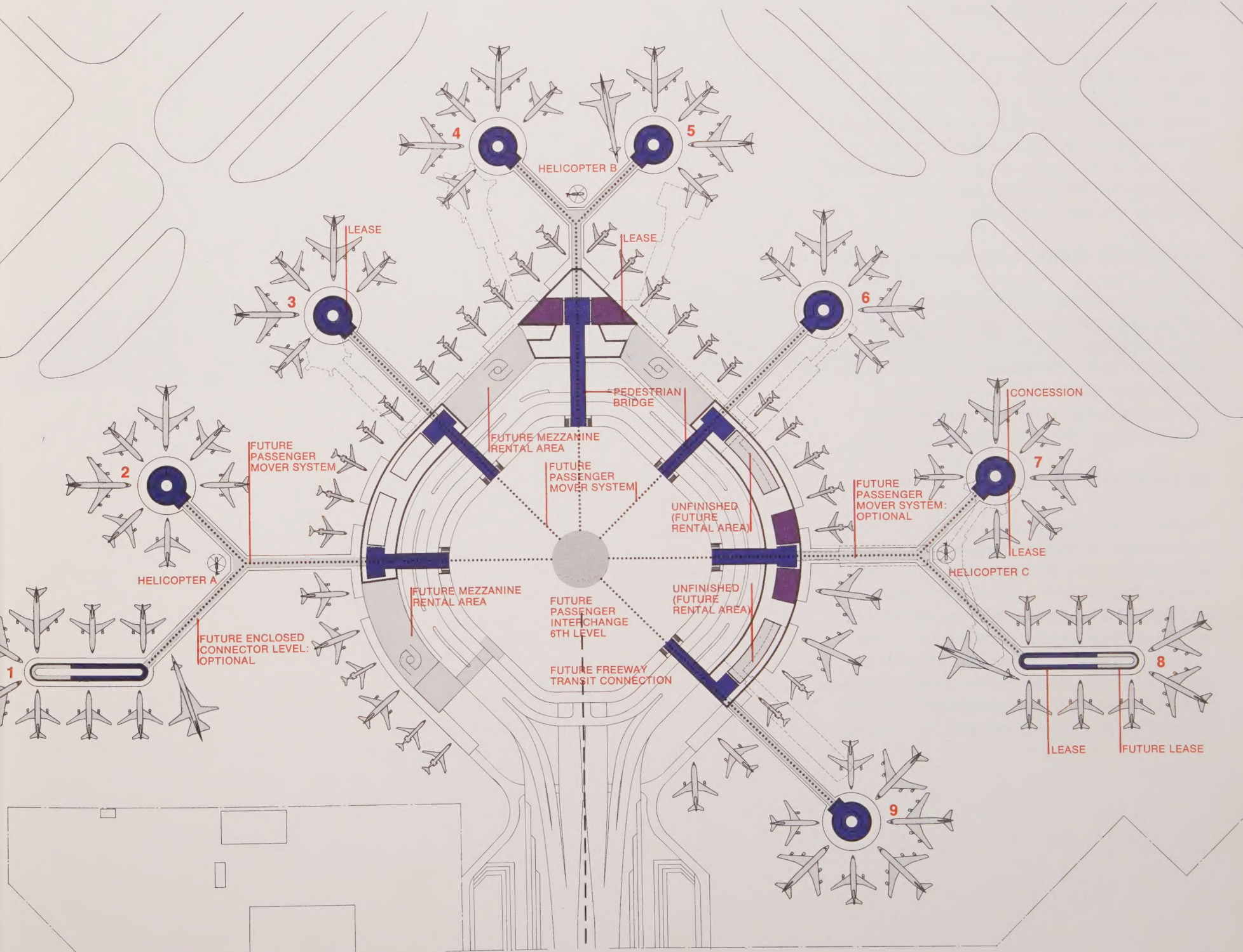
buildings. Incoming passengers and greeters would return in a similar manner, boarding the conveying system at the rotunda, stopping at the terminal for exiting and boarding, then continuing to the passenger hub in the center.

For interline transfers, passengers would be able to travel from any rotunda to the center hub, walk across the hub, and reboard another conveyance carrying them to the new rotunda position or to frontal gates served by the terminal station. The estimated total time for this transfer would be about three and one-half minutes.

The preliminary design criteria for such a system would be 200 passengers per minute capacity leaving each station at thirty second intervals. This system would provide sufficiently rapid transit to be clearly advantageous over walking the same distance. Investigations with companies now developing such systems indicate that such specifications would be feasible.

MEZZANINE LEVEL PLAN

- PASSENGER MOVER (dotted line)
- FUTURE DEVELOPMENT (light grey fill)
- NEW CONSTRUCTION (dark blue fill)
- EXISTING CONSTRUCTION (purple fill)



TERMINAL PARKING SECTION

PARKING ACCESS RAMPS

Cars enter the parking structure on access ramps leading from the main entrance roadway system to the second and third parking levels of the garage structure and, from these levels, up and down to the first and fourth levels. Access to the future fifth level will be by the existing spiral ramps at the center of the structure.

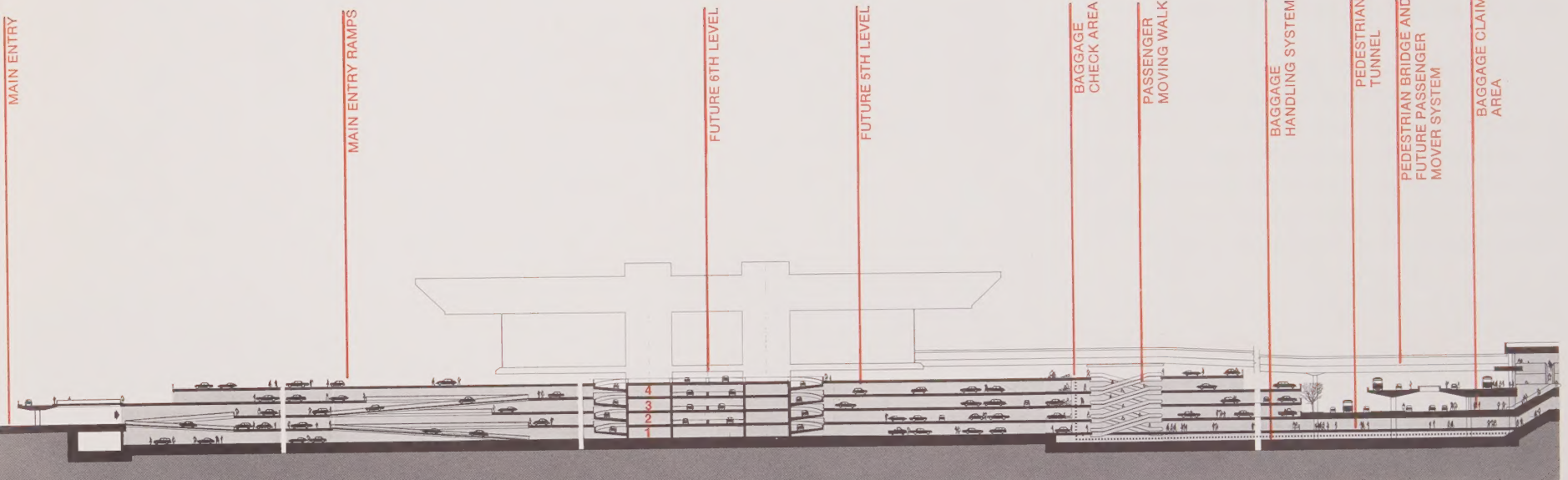
BAGGAGE CHECK-IN AND RETURN

Two existing vertical circulation cores and one additional core will provide baggage check-in in the parking structure. After checking, bags will descend vertically to cross under the perimeter road system in tunnels. Baggage return will be by the reverse route. See also Pages 10 and 24.

FUTURE SIXTH LEVEL

Present indications show that an increasing number of passenger services, such as ticketing and even food service, may be desired at the parking structure location. The position and possible size of the future sixth level are shown in outline form. Sufficient structural capacity will be provided at the center of the parking structure to carry the future passenger circulation and lease areas which may be required.

TERMINAL PARKING SECTION



TERMINAL SECTIONS

PERIMETER ROAD SYSTEM

The perimeter arrivals and departures road systems are designed to permit maximum possible light to reach the lower levels. Landscaping at the parking structure edge of the lower road system and between the express and unloading roadways at the upper road system will be provided.

is shown in dotted lines, passing through the sub-tunnel level, rising to the ground floor terminal level and traveling to the rotundas on the underside of the second corridor connectors.

FRONTAL GATES

Passengers proceeding to the frontal gates pass through the terminal and descend to the boarding lounges at the cold side of the terminal.

ROTUNDA GATES

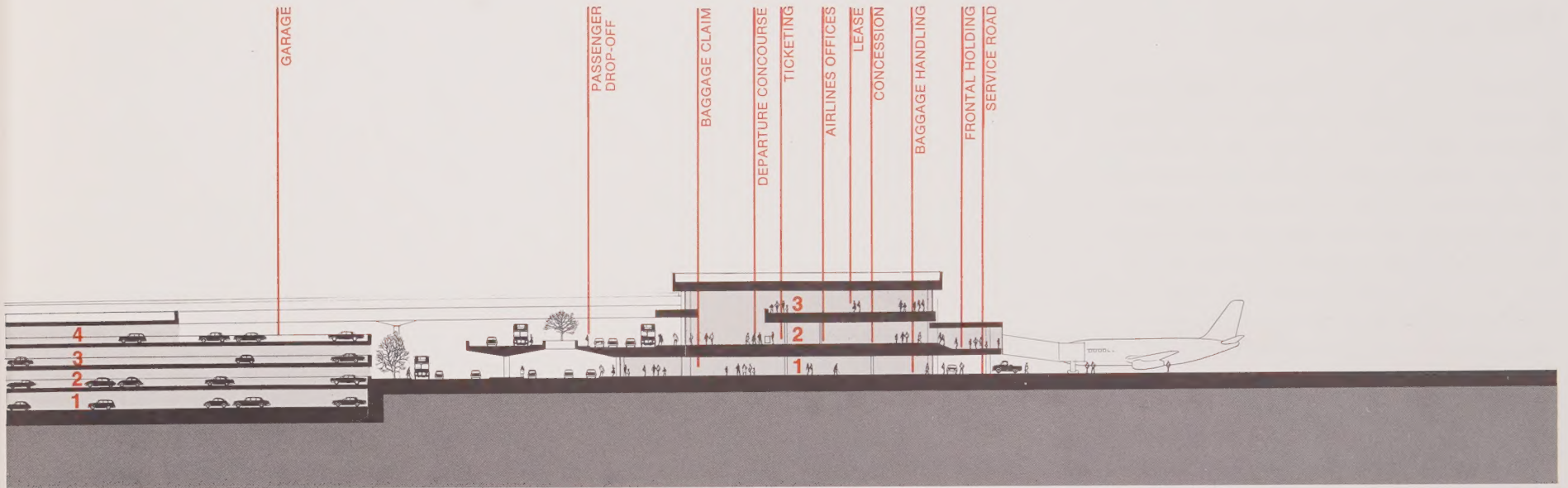
Passengers for the rotunda gates leave the terminal at the second level connecting corridors and enter the rotundas at the passenger boarding lounge level. The sections show the future third level corridor at the level of the bridges crossing from the terminal to the garage. When constructed it would provide one-level travel from the garage to the third rotunda level for departing passengers and one-way return to the terminal at the second level for incoming passengers.

BAGGAGE CLAIM

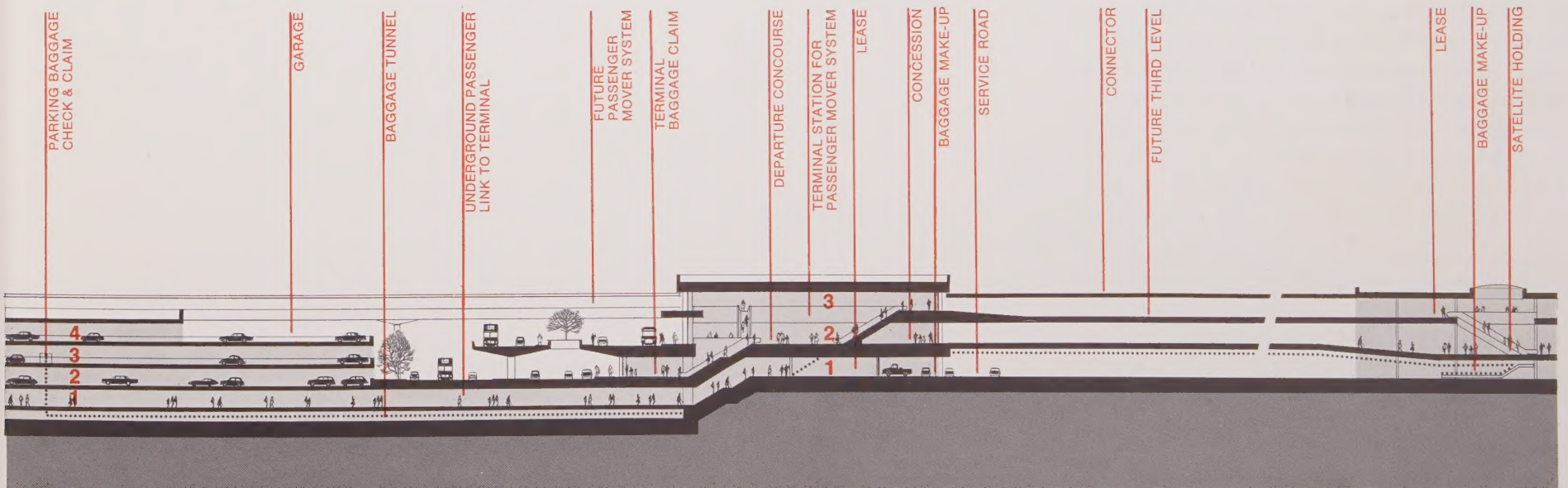
Incoming passengers claiming bags at the present terminal return area would descend one level to this area and exit to the road system. Passengers desiring to claim baggage in the garage would rise to the bridge level or descend to the tunnel level to reach the garage baggage claim islands.

BAGGAGE ROUTE

The path of checked and returned baggage



SECTION AT FRONTAL GATES



SECTION AT ROTUNDA CONNECTORS

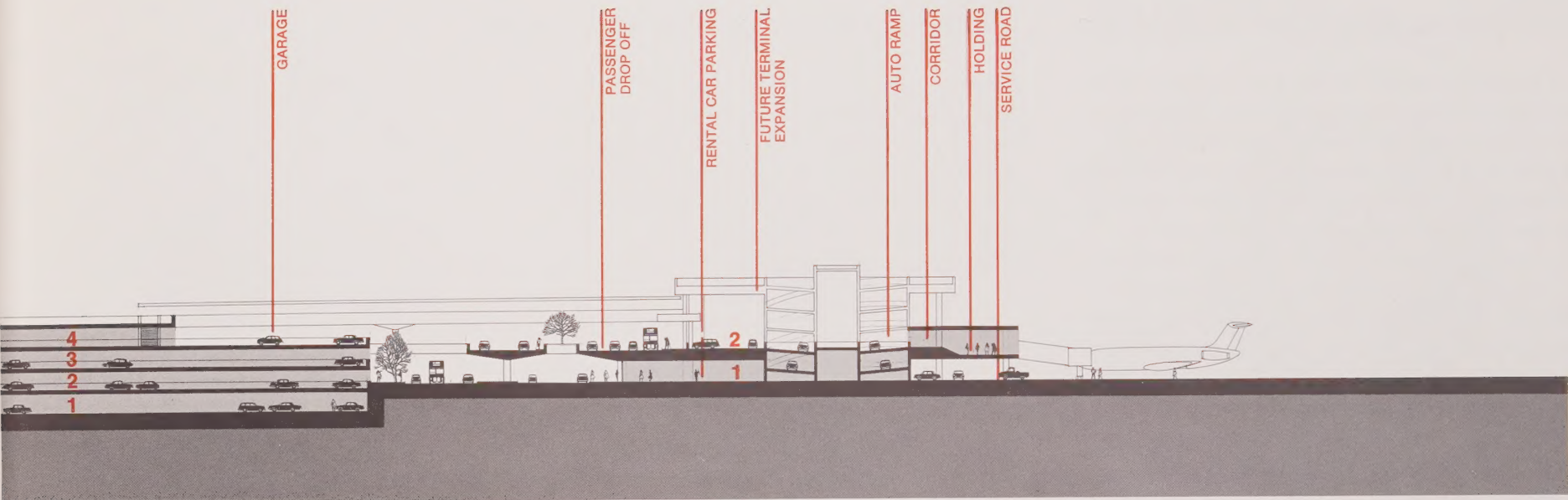
TERMINAL SECTIONS

RENTAL CAR STORAGE

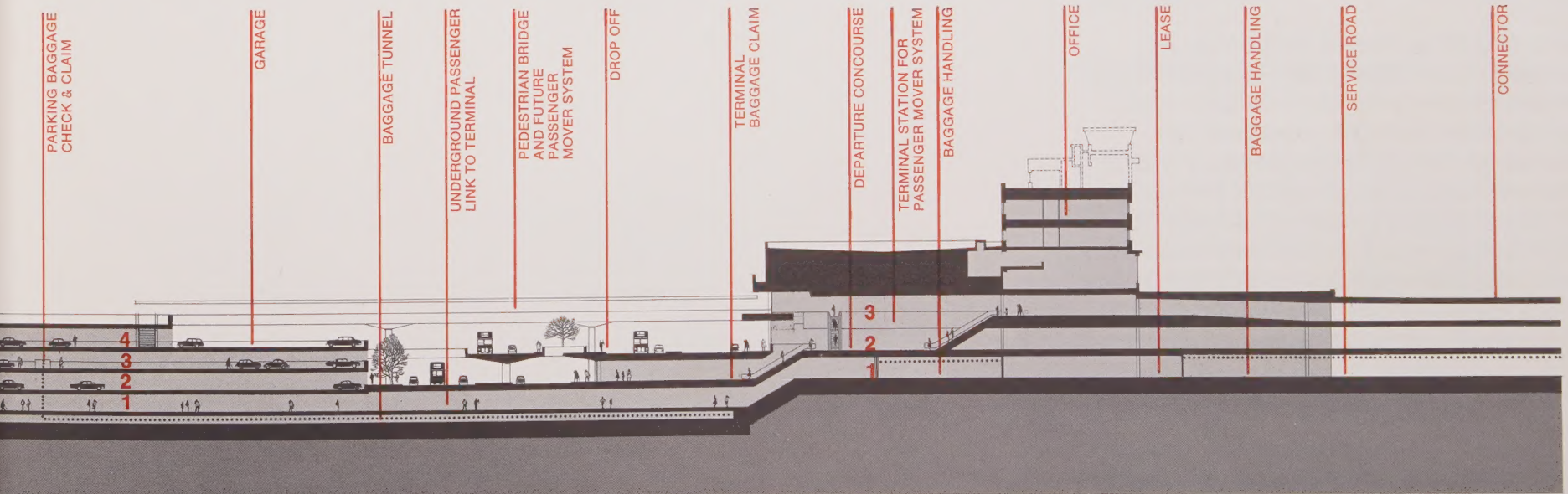
The section through the rental car areas between terminals shows the initial two parking levels for car storage. Provisions will be made for adding additional structure to complete the typical terminal cross section of four levels including the roof. This will permit either expansion of the rental car storage area to four levels, or the lateral expansion of terminal facilities from adjacent terminal areas.

TERMINAL MODIFICATIONS

When the proposed new control tower is constructed, the center terminal will have the present control tower and support facilities removed. The present fourth floor airport management offices and third floor restaurant will remain in their present locations. The south terminal will be widened to provide the frontal gate passenger boarding lounges and additional lease space. Both the present terminal structures will be visually unified with the new terminal construction.



SECTION AT PARKING STRUCTURE



SECTION AT EAST TERMINAL

ROTUNDA PLANS AND SECTIONS

ROTUNDA LEVEL ONE: BAGGAGE

Around the center lease and service core an automated baggage system is shown in accordance with present operating radii and capabilities. When summoned from the main terminal holding area by the loading crew, outbound baggage would arrive at the inner ring by conveyor. When the baggage reaches the appropriate cutoff loop it would descend to the loading area and be fed directly into the container train. Containers would then be trained directly to the adjacent aircraft. For present handling systems this area provides optional make-up area at the aircraft loading position.

ROTUNDA LEVEL TWO: HOLDING AREA

Each circular rotunda contains a net holding area space of 25,500 square feet. If not subdivided into distinct flight areas, the greatest flexibility of use will be obtained. During the first phase of operation, all holding space will not be required for the smaller average aircraft size. In this period temporary concession islands are located near the center of the structure. They will provide service facilities such as food and beverage service.

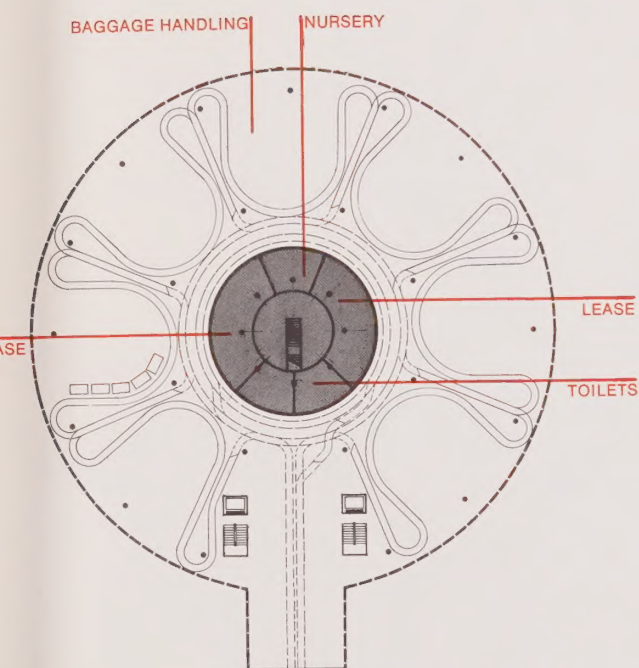
ROTUNDA LEVEL THREE: LEASE

Escalators will connect the second level with the third level where lease and passenger service areas will be provided according to the tenants' desires. Area not required for tenant leasing and concessions will be available for a viewing terrace, which will provide an excellent view of field operations.

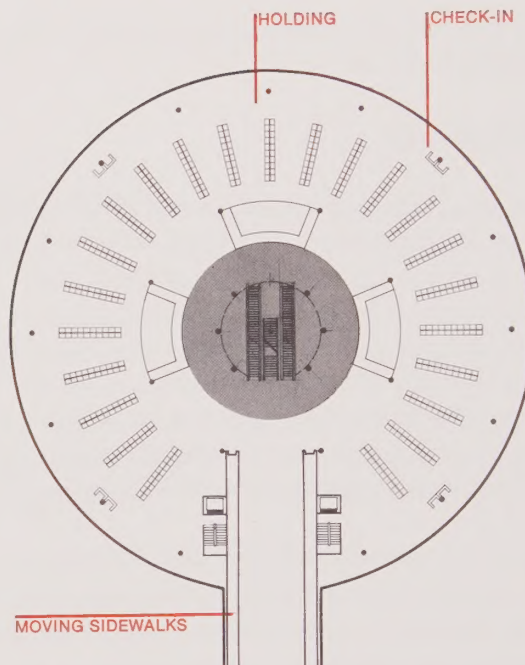
ALTERNATE CONNECTOR ADDITIONS

The two options for future connector capacity expansion are shown, the third level corridor with moving sidewalks or horizontal elevators, or in its place, the future passenger mover system. Structure will be sized to accept either method of expansion.

ROTUNDA PLANS AND SECTIONS



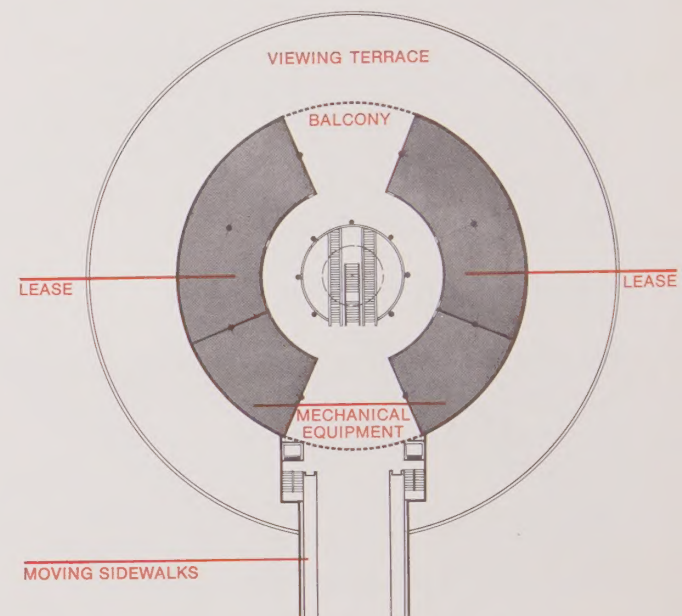
LEVEL 1



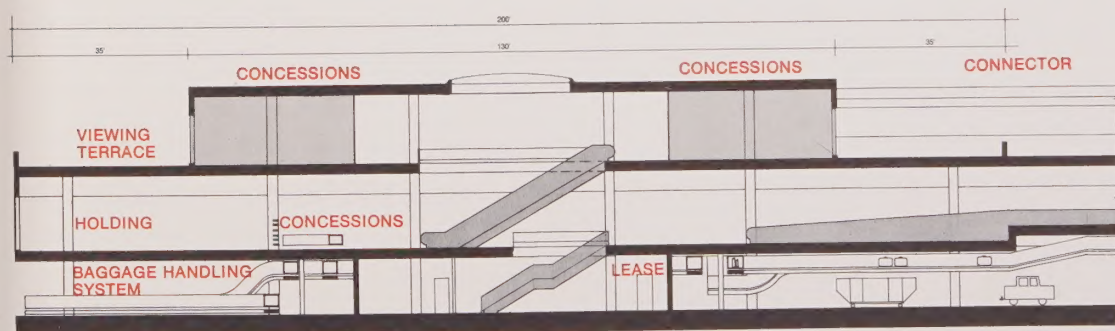
LEVEL 2

FUTURE DEVELOPMENT

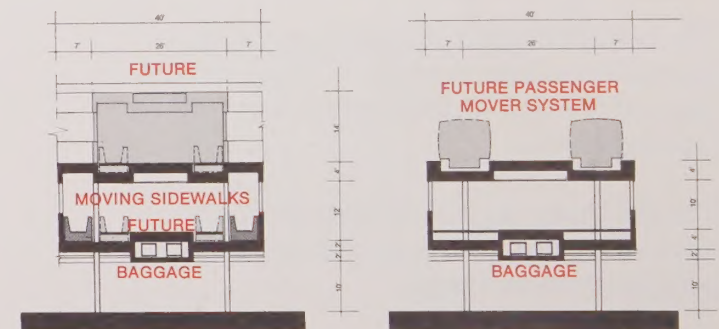
NEW CONSTRUCTION



LEVEL 3



SECTION THROUGH FLIGHT ROTUNDA



SECTIONS THROUGH CONNECTOR



TERMINAL PARKING PLANS 1 AND 2

CAPACITY

The existing 2700-car parking garage will have its existing four levels expanded in this construction phase for a total of 6000 cars. An additional fifth level will be added as traffic and revenues permit to increase the capacity to 7400 cars.

VEHICULAR CIRCULATION

The expanded garage is planned to have entrance and exit facilities on three levels. The main entrance/exit is at a mid-level between the second and third levels of the garage. Ten lanes are provided, and by use of flexible controls, entrance and exit lanes can be varied with the traffic.

The garage can also be entered and exited from the departure and arrival levels with two lanes each way on each level.

A total of eighteen entrance and exit lanes are provided.

The simplified main entrance and exit system consists of straight ramps, ascending and descending to the first four parking levels.

The fifth level, as well as level changes from within the structure, are served by the existing circular ramps.

PASSENGER CIRCULATION

There will be three primary passenger vertical circulation islands connecting all parking levels. Two existing islands will be expanded and a new island added to serve the new terminal area to the north. Secondary elevators will be added at the intermediate pier locations.

After parking, passengers will proceed to these vertical circulation facilities and

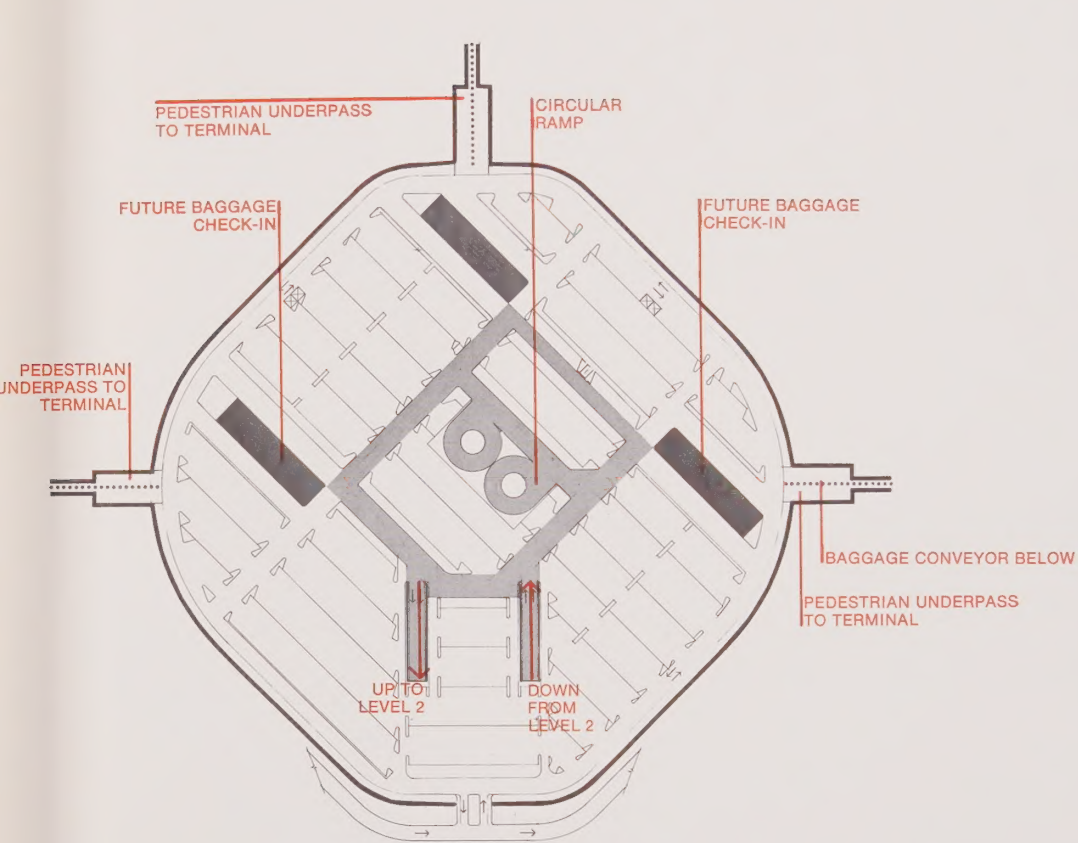
move to the terminal as described in the Mezzanine Plan.

BAGGAGE

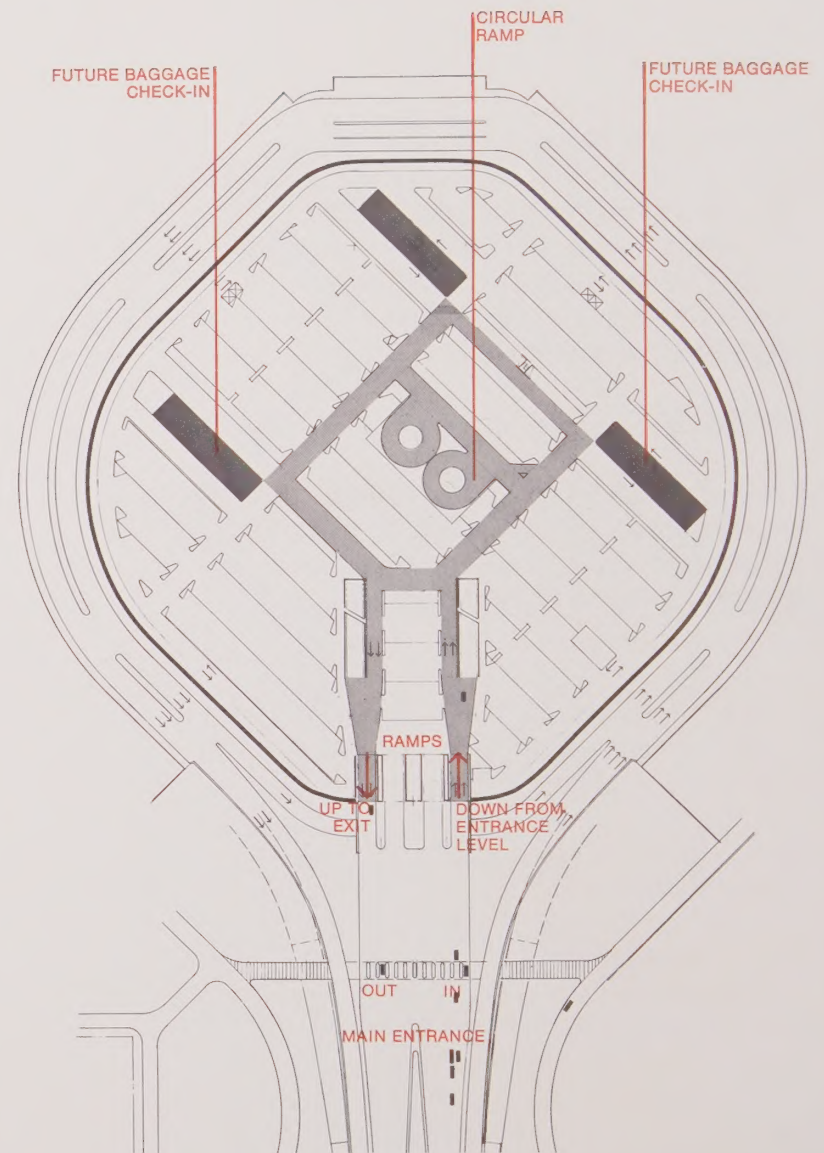
Garage baggage check-in will be available at the completion of construction. A total of 15 checking islands, 3 per floor, are potentially available. Individual airlines will, at their option, provide personnel at one or both of the main entrance levels. After checking his bags, the passenger will proceed to park, then utilize the passenger-circulation systems described above.

When an automated baggage-handling system is installed, automated check-in and return will be available at each vertical circulation island on all five levels.

TERMINAL PARKING PLANS 1 AND 2



LEVEL 1



LEVEL 2

TERMINAL PARKING PLANS 3 AND 4

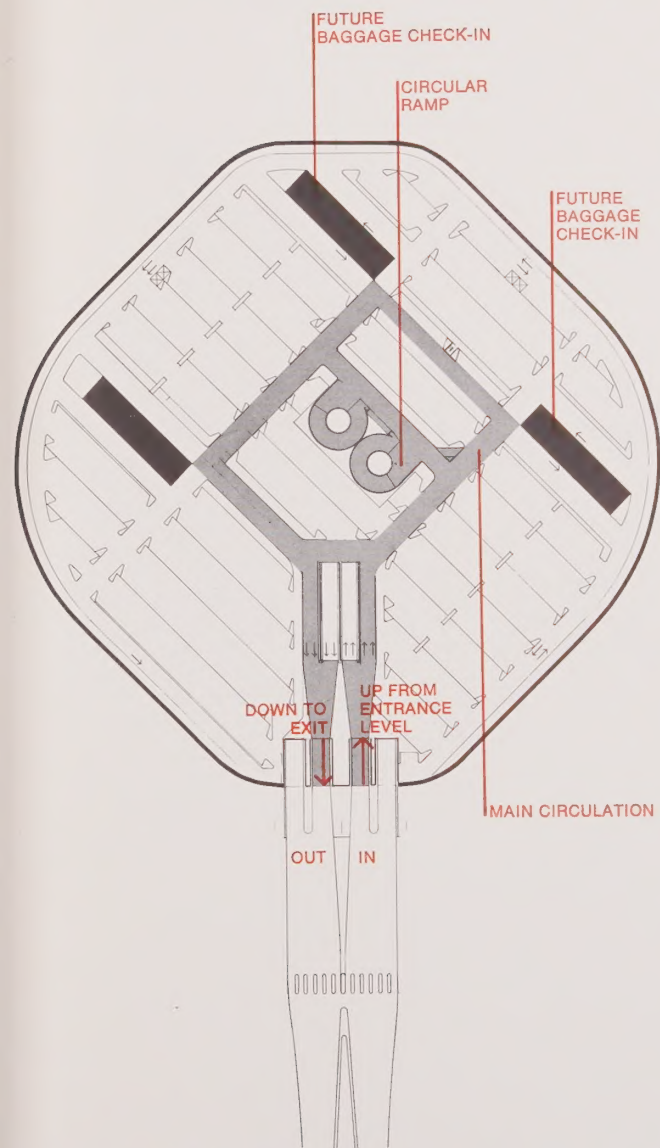
LEVEL 3

Parking level three is a typical parking level and is entered by a one-half level ramp up from the entrance road. Located mid-way between the ultimate five levels of the parking structure, level three would contain the first staffed baggage check islands.

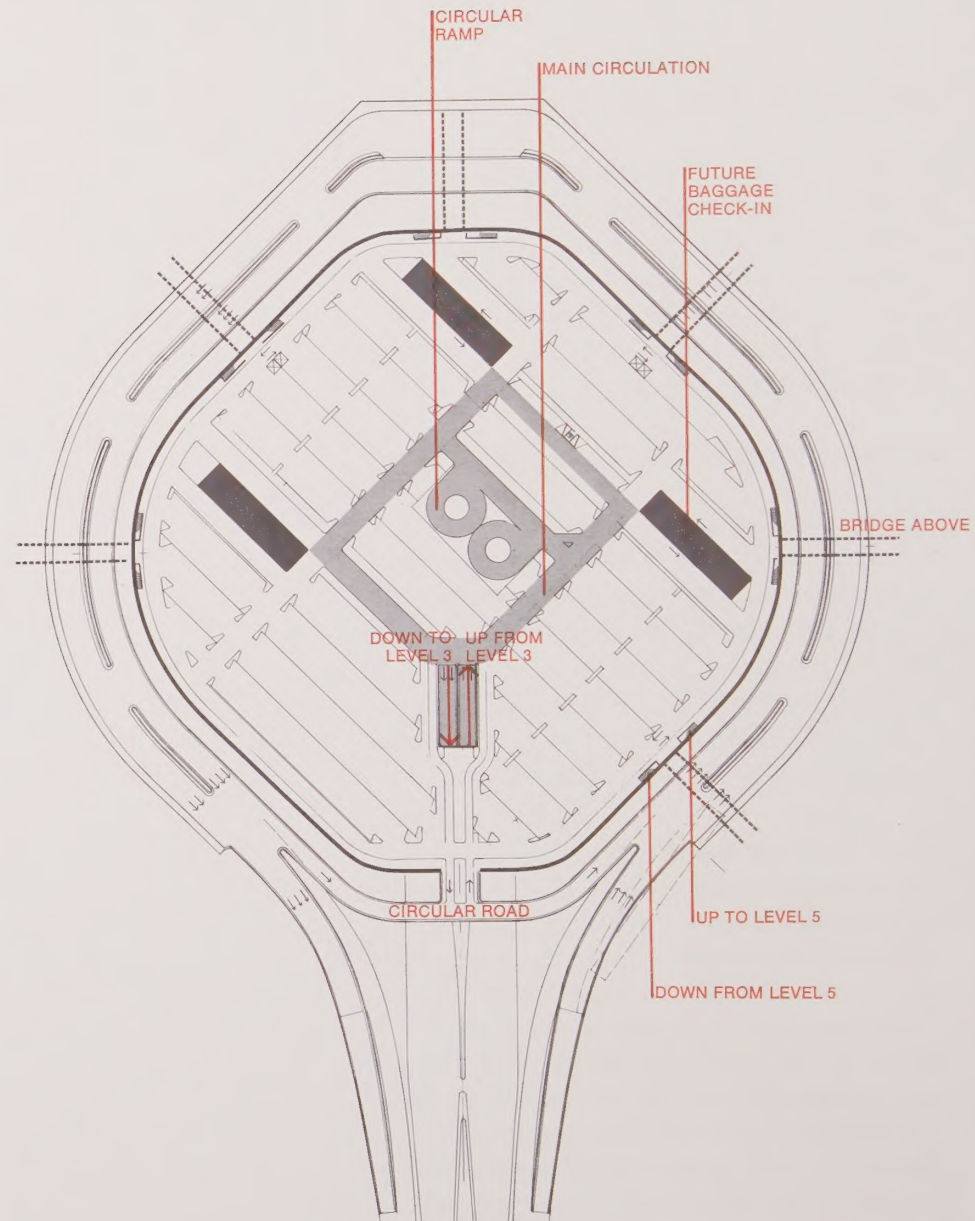
LEVEL 4

Level four is a typical parking level with the addition of vertical circulation, by stair or escalator, up to the six pedestrian bridges crossing to the terminal.

TERMINAL PARKING PLANS 3 AND 4



LEVEL 3



LEVEL 4

TERMINAL PARKING PLANS 5 AND 6

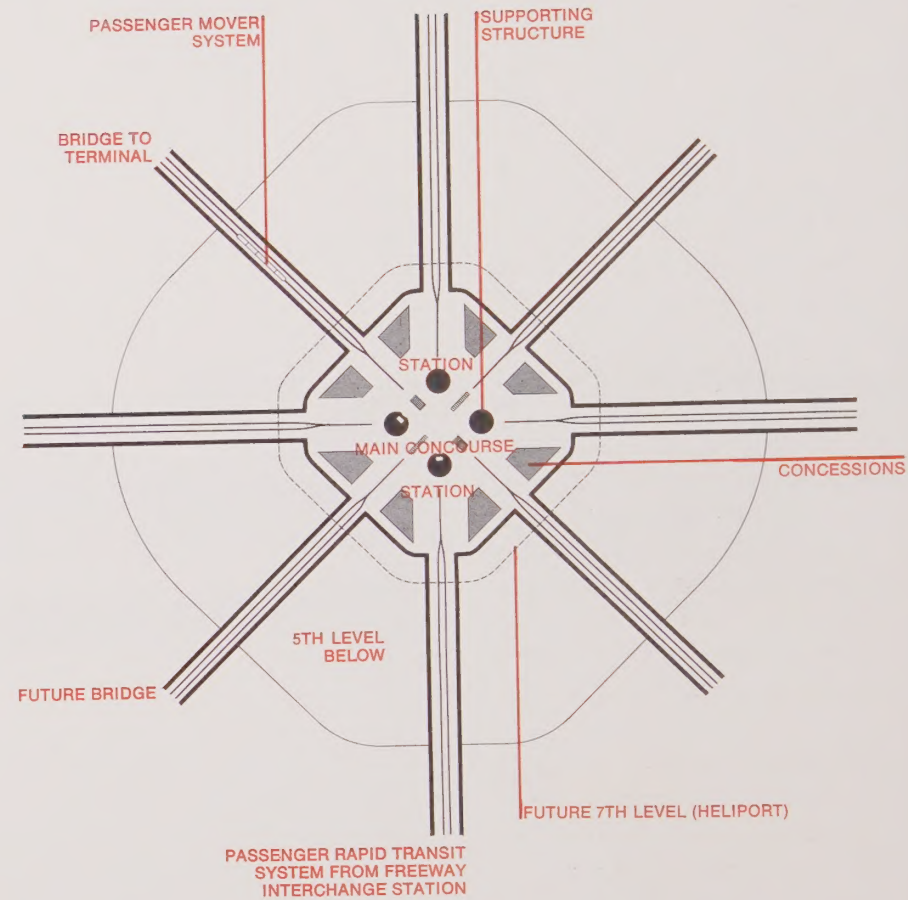
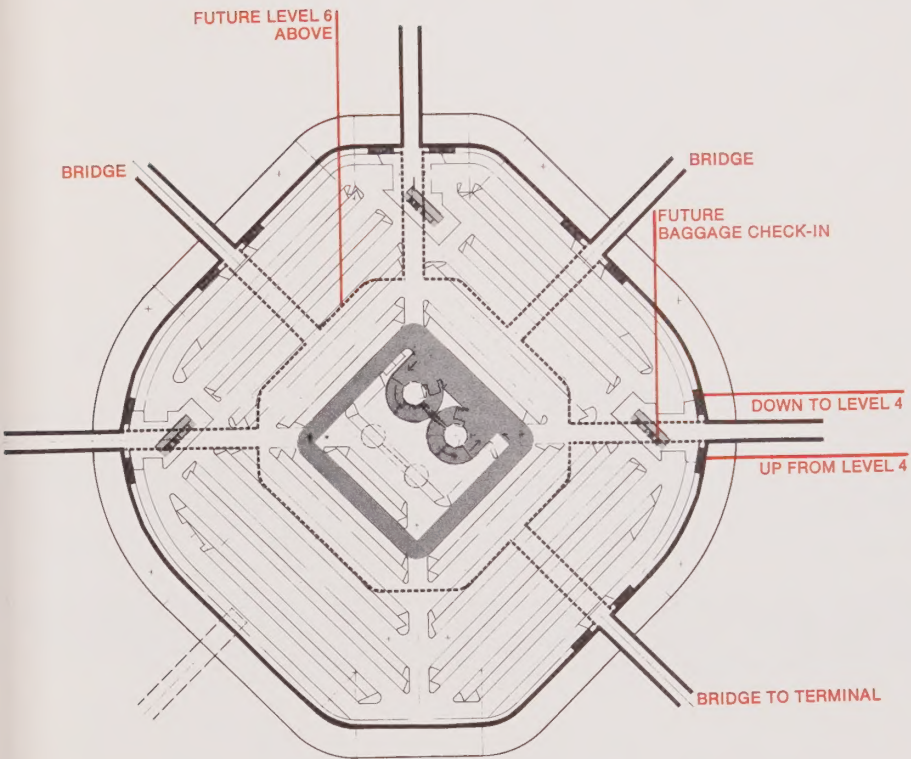
GARAGE LEVEL FIVE

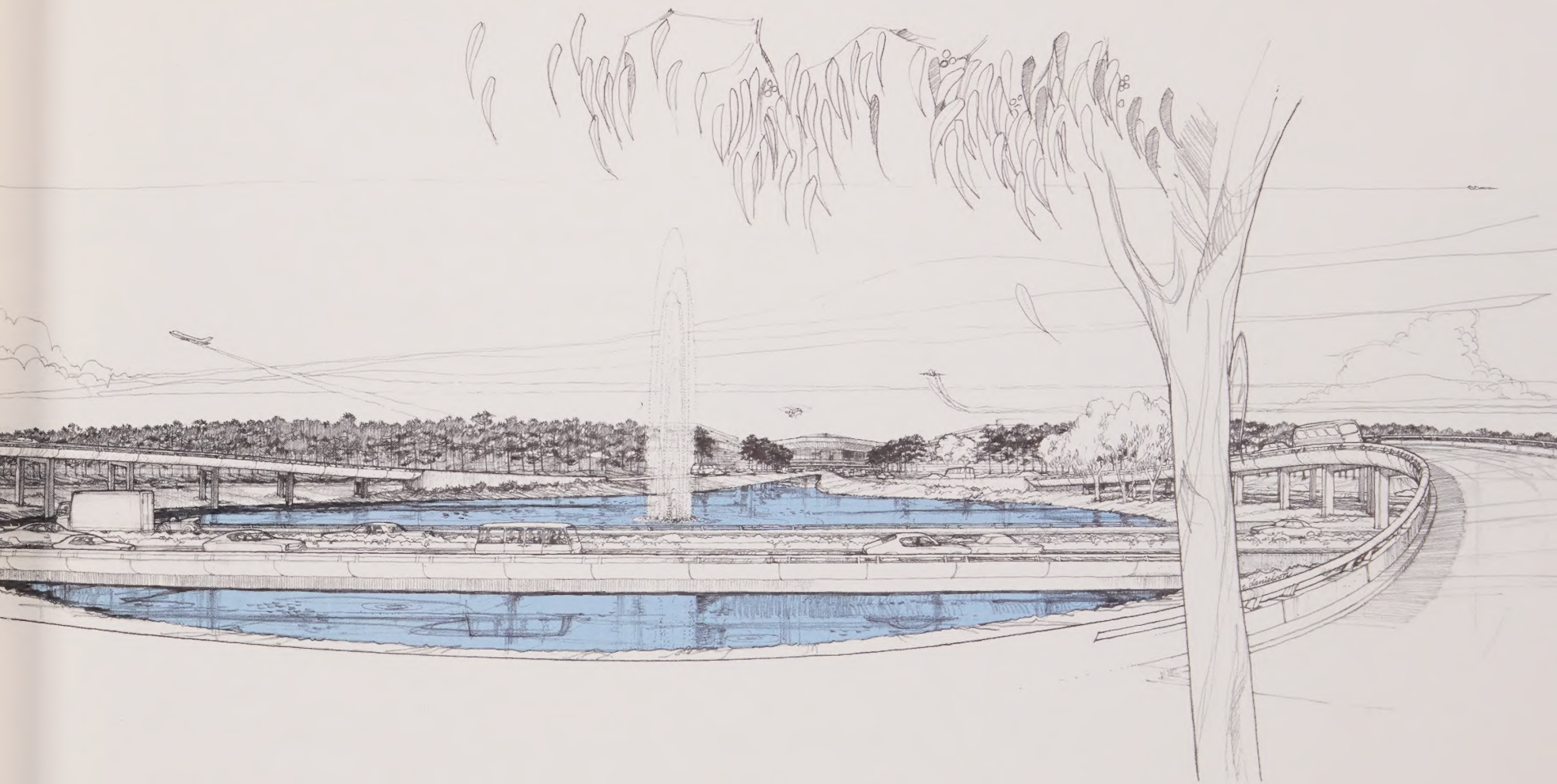
Level five, not part of this construction phase, will be designed with the first four levels of expansion and will be added as needed and revenues permit. When constructed it will provide direct on-level pedestrian circulation to the bridges over the roadway system.

GARAGE LEVEL SIX

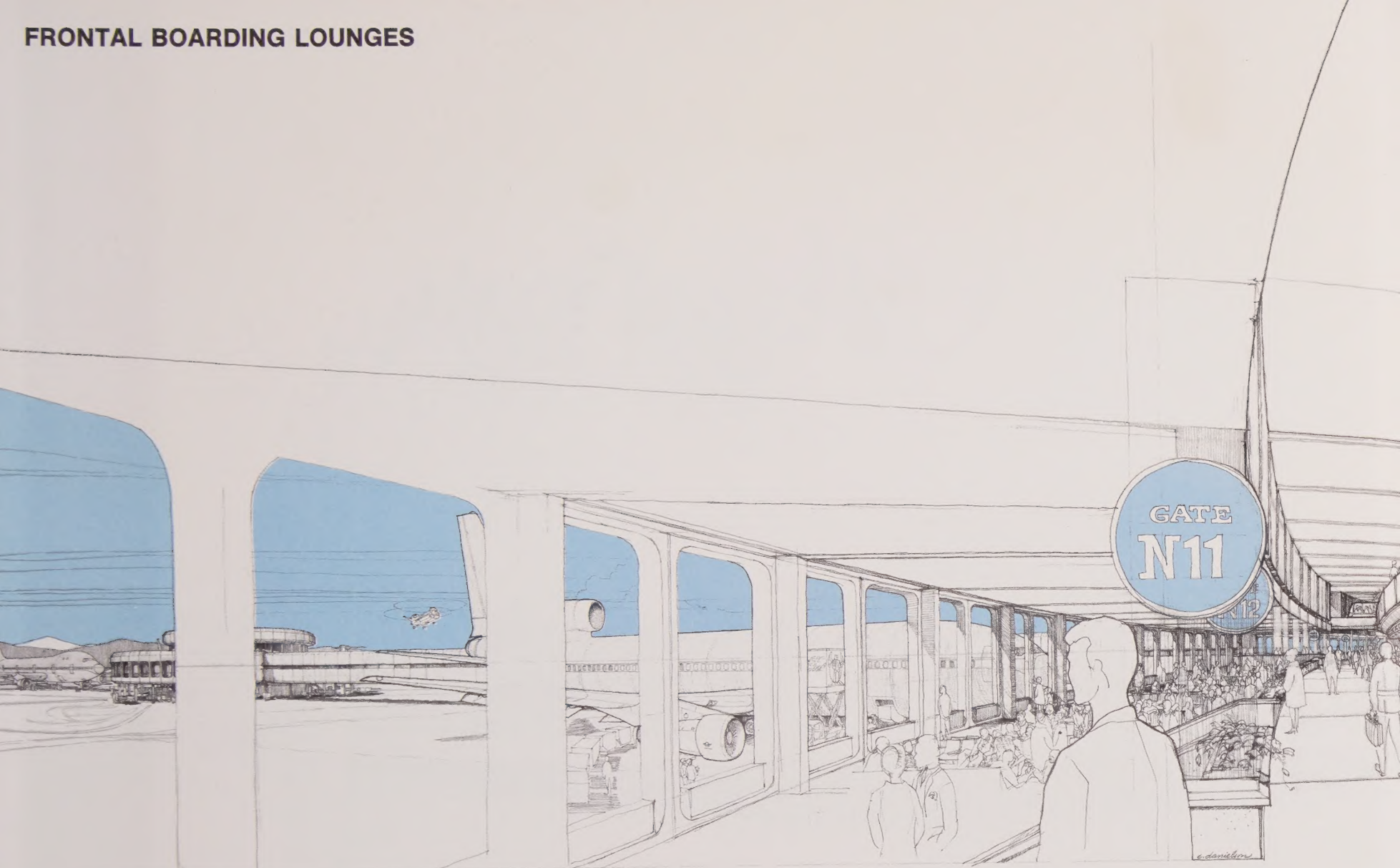
Future level six, also not part of this construction phase, will provide the passenger-moving system transfer point and any supplemental passenger service facilities desired at that time. It will become the focal point of the terminal composition and provide the great space appropriate to this major facility.

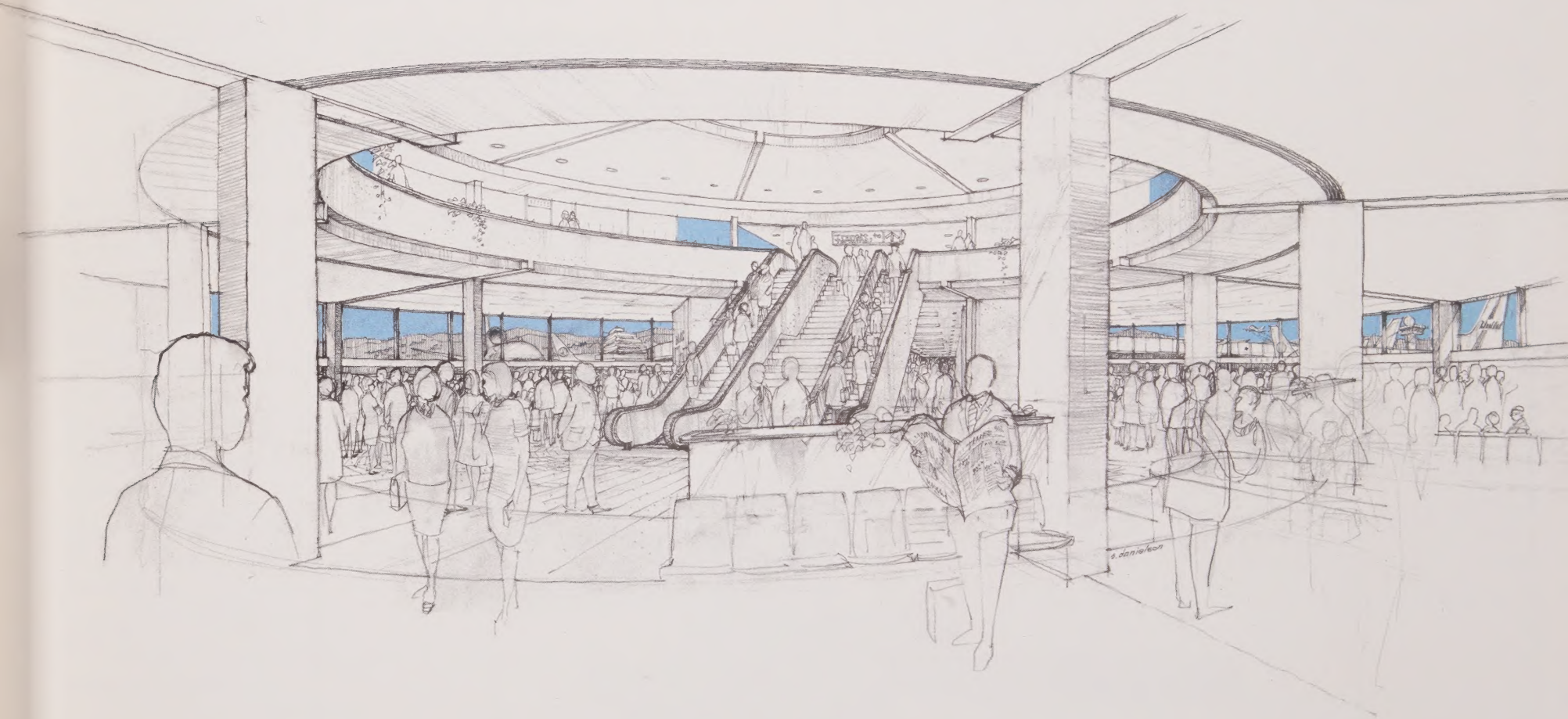
The transit system shown is based on a closed loop system where both tracks are brought to a single track at each end of the run to eliminate wide turning radii and permit simultaneous loading and unloading from opposite sides of the conveyance. Space is shown for a 100-foot-long passenger-mover at each line. Fail-safe mechanisms will insure that the departing conveyance is off the boarding track prior to the arrival of the next unit. With such a loop system, additional cars and groups of cars may be added to increase the capacity as required until the minimum headway time between traveling units is reached.

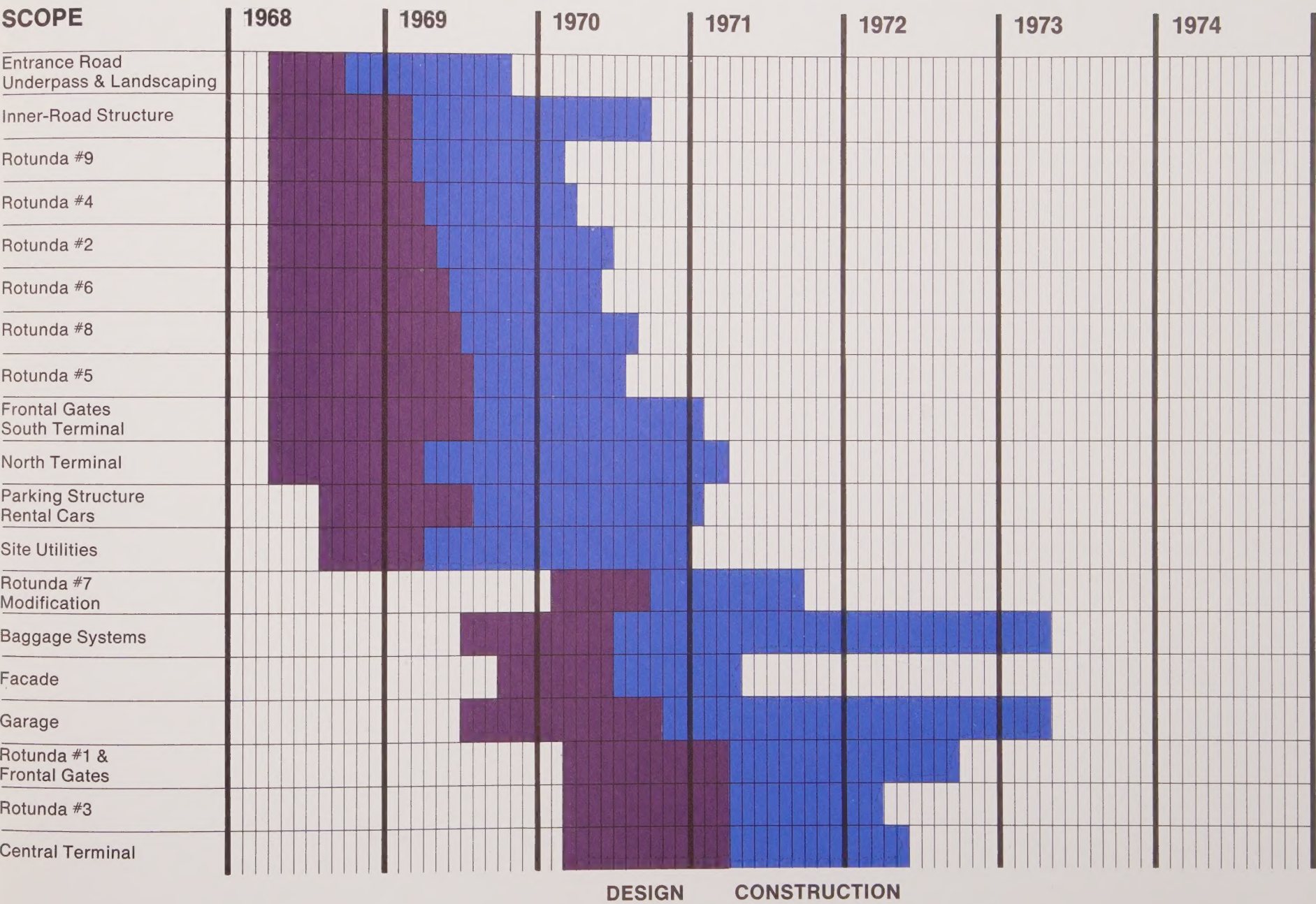




FRONTAL BOARDING LOUNGES







DESIGN RECOMMENDATIONS

Flexibility of use and adaptability to change must be designed for to the maximum extent possible throughout. The more specifically a function is tailored to a particular present technical solution or to an existing operational method, the earlier the facility will become obsolete.

Design features of this plan which will contribute to flexibility are:

- 1 Non-divided passenger holding areas.
- 2 Holding area spaces which do not surround the nose of the aircraft and thus dictate the parking position and possible nose configurations of aircraft.
- 3 Boarding devices which can adapt to a wide range of aircraft floor heights and can be readily respaced around the building perimeter.
- 4 Independent expansion of the frontal holding room areas.
- 5 Exchange of use for building areas where one function can move to a new location, permitting an adjacent function to expand.
- 6 Provision for increase in people circulation to the rotundas by the addition of either (a) additional moving walks, (b) a second level, converting flow in the connectors to one-way traffic, or (c) the addition of rooftop passenger-moving systems.

Because of the great number of pieces of equipment and vehicles lining the ramp area, visual simplicity should be sought in the external design of buildings.



CONSTRUCTION TECHNIQUES

Construction techniques should stress lightweight systems with disconnecting fasteners for possible future relocation or modification. To minimize obstruction to operations, speed of construction will be at an extraordinary premium in this project. To this end, maximum repetition of standard parts will be valuable. Off-site preassembly of major components should be considered, especially for the ramp structures.

GRAPHICS

Communication of necessary information to the airport traveler is a severe challenge. Both clarity and speed are essential as the visitor approaches the terminal complex and moves through its spaces.

Simplicity of organization of the buildings themselves and the movement patterns required is a valuable first step in this process. To this end, this design tries to maintain a clear overall geometry and uniformity of parts. Color coding of major features of the design can further aid identification within the buildings.

Graphic displays which cannot be overlooked or misunderstood are also necessary. They must be located where needed. Properly designed, they can also become an important visual asset to the terminal complex.



FUTURE TERMINAL DEVELOPMENT

FUTURE DEVELOPMENT

It is necessary in this plan to look beyond the present construction phase to the direction of possible future development. As the average size of passenger aircraft continues to increase over the years, additional space for supporting facilities will continue to be required.

Shown here is the fully developed center parking structure with the fifth level added and the sixth level passenger service facilities in place. The terminal ring has been fully developed and completes the horseshoe configuration around the center parking structure. An additional bridge has been added, connecting the parking structure to the northwest sector of the expanded terminal.

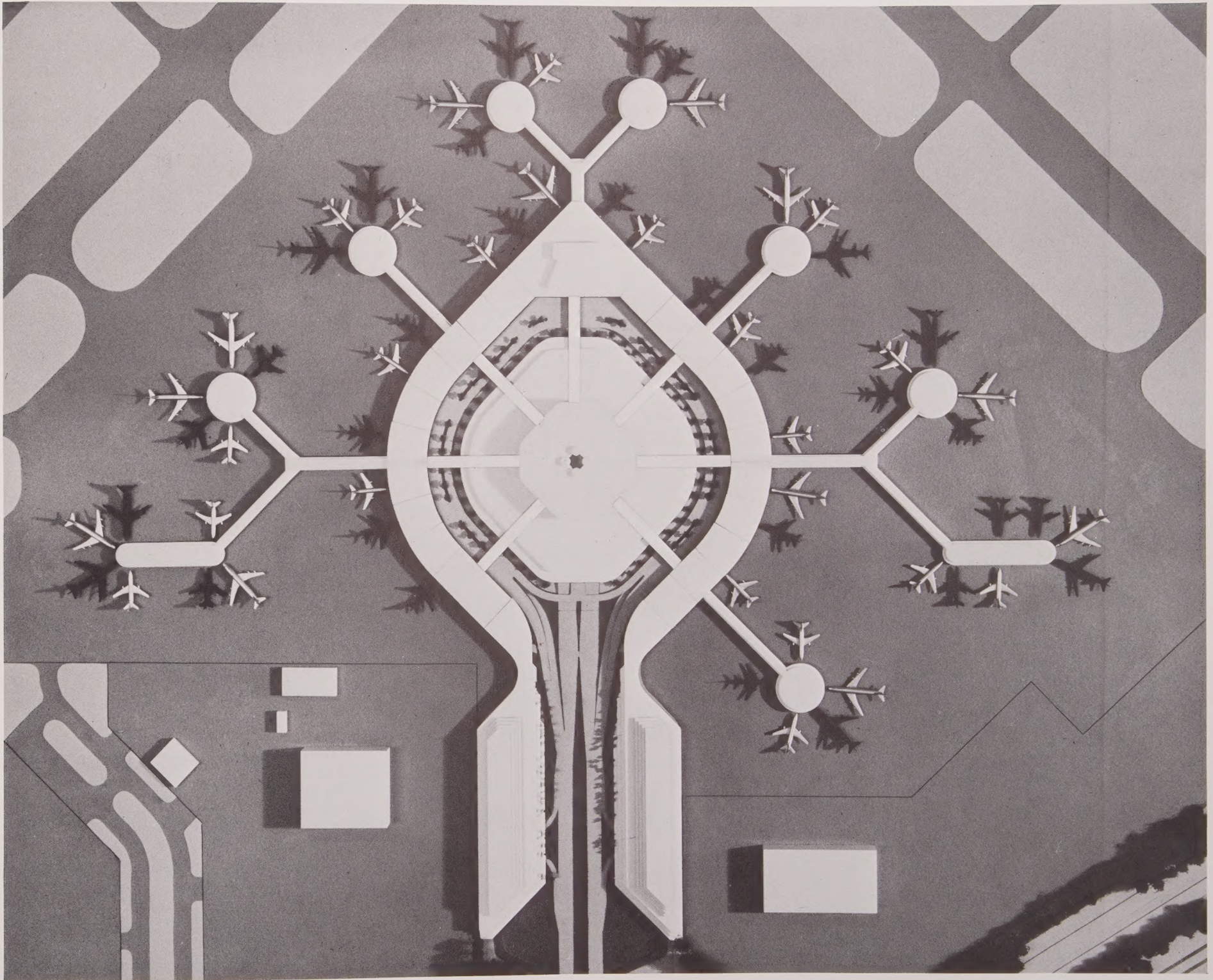
Even if a public transit system to the airport is realized, additional parking structures will almost certainly be required to handle the increased passenger traffic of the next decades. Shown are two tiered parking structures extending toward the freeway from the ends of the terminal structure, providing five additional parking levels on either side of the main entrance roadway. The top level will be at the same elevation as the terminal roof and the structures would be visually unified with the terminal facade. If warranted at the time these parking structures are created, they could be designed to carry additional commercial space on their roofs. This would provide space for possibly a major airport hotel facility on one side and office space for airport-related companies on the other. The new parking structures would be connected beneath the approach roadway for balancing demand and to provide circulation from the garages to and from the freeway. In lieu of the rooftop commercial structures, additional parking levels could be constructed if required.

OBJECTIVES

The challenge for airport design is to conceive a pattern for development that can be highly responsive to change and yet accept these changes within a framework of functional and visual order.

The needs of the future, however, must be weighed against the needs of the present. Requirements for (1) custom solutions to present functions and (2) achieving the maximum number of aircraft parking positions on the limited ramp space both work against future flexibility and yet must be satisfied. This definitive plan seeks a proper balance between these opposing, yet important, needs.

If it can achieve this balance and a final unity of design as well, the objectives of this study will have been achieved.



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